

EXPLANATION OF THE PLATES.

PLATE V.

- Fig. 1. *Tellina solidula* with a colony of *Monobrachium parasitum*, magnified: *a*, a young *Protohydra*-like specimen; *b*, gonophore.
- Fig. 2. Three specimens of fully matured hydranths and a gonophore, more magnified: *a*, the oral orifice of the body; *b*, its single tentacle; *c*, chitinous membrane, covering the cœnosarc and forming a continuous hydrorhiza; *d*, a slightly developed hydrocaulus; *e*, gonophore.
- Fig. 3. A gonophore pressed by a covering-plate: *a*, chitinous membrane covering the medusa; *b*, umbrella of the medusa; *c*, the short pedicle of the gonophore; *d*<sup>1</sup> *d*<sup>2</sup>, a pair of sexual sacs; *d*<sup>5</sup> *d*<sup>6</sup> *d*<sup>7</sup> *d*<sup>8</sup>, the same; *d*<sup>3</sup>, sac only, the other is omitted; *g*<sup>1</sup>, *g*<sup>2</sup>, *g*<sup>3</sup>, *g*<sup>4</sup>, the four radiating canals; *f*<sup>1</sup>, *f*<sup>2</sup>, *f*<sup>3</sup>, *f*<sup>4</sup>, the four principal tentacles, into which are continued the radiating canals, and between which are disposed the other twelve tentacles.
- Fig. 4. A gonophore less compressed by a covering-glass: *a*<sup>1</sup> *a*<sup>2</sup>, two radiating canals, very distinctly seen; *b*<sup>1</sup>, *b*<sup>2</sup>, *b*<sup>3</sup>, *b*<sup>4</sup>, four tentacles, the first developed; *c*, chitinous membrane.
- Fig. 5. A gonophore with the eight sexual sacs seen through the coverings.
- Fig. 6. The same gonophore seen from above; the sixteen tentacles are seen.
- (All the figures excepting figs. 1 and 2 are drawn by the camera lucida.)

PLATE VI. (drawn by the camera lucida).

- Figs. 7, 8, 9, 10. Transverse sections of the hydranth.
- Fig. 11. A thread-cell.
- Fig. 12. Transverse section of a gonophore in an advanced state of development, with the umbrella, the four radiating canals, and the eight sexual sacs.
- Fig. 13. Transverse sections of the same gonophore, but at a higher part of it, where the original four sacs are not yet quite divided longitudinally into eight. *a* and *b* are the two opposite sacs at a more advanced stage of longitudinal division than the two other sacs.
- Fig. 14. The same from another gonophore, not yet so mature as in figs. 6, 7, but made at the same part of it as the section presented in fig. 6.
- Fig. 15. *Polyserias Hincksii*, nat. size.
- Fig. 16. The same, magnified.

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XXXI.—*The Post-tertiary Fossils procured in the late Arctic Expedition; with Notes on some of the Recent or Living Mollusca from the same Expedition.* By J. GWYN JEFFREYS, LL.D., F.R.S.\*

MR. EDGAR SMITH, of the British Museum, has published, in the 'Annals and Magazine of Natural History' for this month

\* Communicated by the author, and read at the Plymouth Meeting of the British Association, 20th Aug. 1877.

(August 1877), a list of the recent or living Mollusca brought home by Capt. Feilden and Mr. Hart, the Naturalists of the last of our Arctic voyages ; and I propose to supplement that list with a notice of the Post-tertiary fossils collected not only by the Naturalists, but also by Lieut. Egerton and Dr. Moss, two of the officers of H.M.S. 'Alert.'

I cannot help sharing Mr. Smith's expression of disappointment with the conchological results of the Expedition. The number of Post-tertiary as well as of recent species of Mollusca is very scanty. In analogous or apparently similar cases of so-called "glacial" and raised sea-beds in Great Britain, Scandinavia, and Canada, which I have examined, I collected in two or three hours a greater number of fossil species than those procured in the Expedition. However, great allowance must be made for the difficult circumstances under which the specimens were collected in such very high latitudes ; and I have no doubt that the Naturalists did their best. The fossil specimens brought home by the Naturalists are in the Museum of Economic Geology, under the charge of the Palæontologist, Mr. Etheridge, and in the British Museum ; Lieut. Egerton presented his specimens to the Geological Society ; and Dr. Moss kindly placed his at my disposal.

The subject of the present communication is especially interesting to geologists, because it is closely connected with the history of those former conditions and changes of climate which left so many traces in Europe and North America, in the form of raised beaches and sea-beds. The investigation of the organisms, particularly of the Mollusca, imbedded in those deposits becomes highly important for the study of the Post-tertiary or Quaternary epoch, as well in a geographical as in a hydrographical point of view.

The extent of oscillation to which the earth's crust in the northern hemisphere has been subjected, during a comparatively recent period, is remarkably exemplified in the case of *Saxicava rugosa*. The large arctic form of this species in a fossil state has been dredged between the Hebrides and Faroes, at the depth of 2070 feet (345 fms.) ; the same form is abundant on the surface at Montreal ; and it has been found on Moel Tryfaen at the height of 1360 feet : a difference of 3430 feet between depression and elevation is thus shown. The usual habitat of *S. rugosa* is shallow water, although I have a specimen from 1230 fms. or 7380 feet, and fragments from 1622 fathoms or 9732 feet. The last-mentioned depth, added to the height of the Moel Tryfaen sea-beach, gives a measurement of 11,092 feet, being nearly equal to two thirds of the height of Mont Blanc.

The position of the stations where these fossils were found in the Arctic Expedition is as follows:—

- No. 1. N. lat.  $82^{\circ} 27'$ , W. long.  $61^{\circ} 42'$ . Shell Flats, 200 feet above the present level of the sea; sandy mud, interstratified with layers of moss (Moss).
- No. 2. N. lat.  $82^{\circ} 32'$ . North of Dumbbell Harbour, 23rd July, 1876 (Egerton).
- No. 3. N. lat.  $82^{\circ} 33'$ . Kane Valley; mud beds, 40 feet (Feilden).
- No. 4. N. lat.  $82^{\circ} 35'$ . Blackcliff Bay, "in great quantities at all heights up to 100 feet above present sea-level;" Port Foulke, "300–400 feet above present sea-level" (Egerton).
- No. 5. Plain between Polaris Bay and Newman's Bay, 600 feet (Hart).
- No. 6. Franklin-Pierce Bay; "ancient mud beds, 180 feet" (Hart).
- No. 7. Cape Frazer; "10 feet above sea-level" (Hart).
- No. 8. Bivouac Plain; "old-sea bottom" (Hart).
- No. 9. Floeberg Beach; "mud banks, 200 feet" (Hart). The latitude is not marked; but Dr. Moss tells me this station is near No. 1.
- No. 10. Plain, Musk-ox Bay; "100 feet" (Hart).
- No. 11. Near Simmond's Isle, towards Cape Joseph Henry; "40 feet, October 1875" (Feilden).
- No. 12. Isthmus, Cape Joseph Henry (Feilden).

The last station was the most northern.

To avoid repetition, the number of the station and the name of the discoverer only will be given. The letters "ft." signify the height in feet above the present level of the sea, and "fms." the depth in fathoms of six feet; "l. w." stands for low-water mark at spring-tides. The fossil species of Mollusca are 18, of Actinozoa 1, of Foraminifera 1, and of marine plants 1, being altogether 21 species.

## MOLLUSCA.

### CONCHIFERA.

*Pecten Grœnlandicus*, G. B. Sowerby.

*Pecten Grœnlandicus*, G. B. Sowerby, Thes. Conch. part ii. p. 57, pl. xiii. f. 40 (1842).

Station No. 1 (Moss); No. 9 (Feilden).

RECENT. Arctic Ocean (Parry): Spitzbergen (Torell): Fin-

mark, 40–150 fms. (Lovén, Sars): White Sea and coasts of Russian Lapland (Middendorff): Gulf of St. Lawrence, 150 fms. (Whiteaves): 'Porcupine' Expedition, 1869, 420–542 fms., young; 1870, Bay of Biscay, 257–539 fms., young: Arctic Expedition, 5½–35 fms. (Feilden and Hart).

FOSSIL. Tangy Glen, W. Scotland (Robertson and Cross-key): E. Scotland, 30–40 ft. deep: Elie, a few ft. below the surface (Jamieson).

The shell is certainly not "equivalve," as Sowerby described it. It is the *P. vitreus* of Gray in the 'Supplement to the Appendix of Parry's First Voyage,' but not Chemnitz's species of that name.

*Leda pernula*, Müller.

*Arca pernula*, Müll. in Beschäftigungen naturf. Freunde, vol. iv. p. 35.

Var. *falcula*. Shell sickle-shaped, longer (from the beak to the front margin) and flatter than the variety *Jacksonii* of Gould or *buccata* of Steenstrup; the "rostrum" or point is short, blunt, and more or less upturned in the adult; front margin curved.

St. No. 1 (Moss).

RECENT. Spitzbergen (Torell, Eaton): Wellington Channel (Belcher). The typical form and other varieties inhabit both sides of the North Atlantic as well as the North Pacific, at depths of from 20 to 150 fms.: 'Porcupine' Exp. 1869, 251 fms.; 1870, Bay of Biscay, 305–517 fms.: 'Valorous' Exp. 15–175 fms.: Arctic Exp., 5½ fms. (Feilden).

FOSSIL. Post-tertiary or "glacial" beds in the North of England, N. Wales, Ireland, Scotland, Scandinavia, and Canada, surface to 320 ft.: Moel Tryfaen, 1330–1360 ft. (Darbishire).

Variable in shape and sculpture. Having many synonyms, or polyonomatous.

*Leda frigida*, Torell.

*Yoldia frigida*, Tor. Bidr. t. Spitzbergens Molluskfauna, p. 148, t. 1. f. 3 (1859).

St. No. 3 (Feilden).

RECENT. Spitzbergen, 30–60 fms., and Greenland, 250 fms. (Torell): Iceland (Mus. Copenhagen): Finmark, 200–300 fms. (Sars): Shetland, 60 fms. (J. G. J.): Gulf of St. Lawrence, 150 fms. (Whiteaves): 'Porcupine' Exp., 1869, 114–1360 fms.; 1870, Bay of Biscay, 227–1095 fms.: 'Valorous' Exp., 175 fms.

*Yoldia nana* of M. Sars.

*Arca glacialis*, Gray.

*Arca glacialis*, Gray, Suppl. App. Parry's Voyage, p. cexliv (1824).

St. No. 9 (Feilden).

RECENT. Arctic Ocean (Parry): Wellington Channel (Belcher): 'Bulldog' Exp., 1622 fms. (Wallich): Iceland (Mus. Copenh.): Spitzbergen (Torell): Scandinavia, 60-300 fms. (Malm and others): Shetland, 80-85 fms. (J. G. J.): 'Lightning' Exp., 189 fms.: 'Porcupine' Exp., 1869, 164-422 fms.; 1870, Bay of Biscay, 45-690 fms.; Mediterranean, 60-1456 fms.: Ægean (Forbes, *fide* M'Andrew): Mediter., 30-300 fms. (Stefanis, Nares, and others).

FOSSIL. Norway, 20-240 ft. (Sars and others): Sicily (Philippi and others): Maine Co. (Lyell).

Synonyms: *A. obliqua*, Philippi, 1844; *A. lactea*, Malm, 1853 (non Linné); *A. Korenii*, Danielssen, 1859.

*Axinus flexuosus*, Montagu; var. *Gouldii*.

*Tellina flexuosa*, Mont. Test. Brit. p. 72.

St. No. 1 (Moss).

RECENT. (Type and varieties.) N. Atlantic, Mediterranean, and Adriatic, 3-450 fms.: Gulf of Mexico, 91 fms. (Pourtales): Swedish Exp., 1868, 540 fms.: 'Lightning' Exp. 550 fms.: 'Porcupine' Exp., 1869, 96-557 fms.; 1870, Bay of Biscay, 20-1095 fms.; Mediterr., 5-110 fms.: 'Valorous' Exp., 7-410 fms.: Arctic Exp., 5½ fms. (Feilden): N. Pacific (P. Carpenter).

FOSSIL. (Type and varieties), Scandinavia, Scotland, Monte Mario, Sicily, Canada, and Maine, 0-320 ft.: Coral-line and Belgian Crag.

The varieties *Gouldii*, *Sarsii*, and *polygona* are connected by intermediate gradations; the last-named variety is the most aberrant.

*Astarte borealis*, Chemnitz.

*Venus borealis* Linnæi, Ch. Conch. Cab. vol. vii. p. 26, t. 39. f. 412, 414 (in ind. Schröter *V. borealis*); not *V. borealis*, L., = *Lucina borealis*.

St. No. 1 (Moss); No. 4 (Egerton); Nos. 5, 8, and 10 (Hart); No. 11 (Feilden).

RECENT. Arctic Ocean and N. Atlantic, southwards to the Danish coasts, 2-80 fms.: Swedish Exp., 1868, 1300 fms. (fragment): 'Valorous' Exp., 12-1450 fms.: Arctic Exp., 5½ fms.: N. Pacific (Midd.).

FOSSIL. N. and W. England, Wales, Ireland, Scotland,



Scandinavia, and N.E. America, surface to 440 ft.: Macclesfield, 500–600 ft., and Moel Tryfaen, 1330–1360 ft. (Darbishire): Port Kennedy, Greenland, 100–500 ft. (Walker).

Synonyms very numerous. A specimen dredged in Discovery Bay by Capt. Feilden corresponds with the variety *elliptica* of *A. sulcata*.

*Astarte fabula*, Reeve.

*Astarte fabula*, Reeve, in Belcher's Last of the Arctic Voyages, vol. ii. p. 398, pl. xxxiii. f. 5, *a*, *b* (from type!).

St. No. 3 (Feilden).

RECENT. Wellington Channel (Belcher): E. Greenland (Möbius): Spitzbergen (Torell, Eaton): Arctic Exp., 5½–15 fms. (Feilden).

I am now satisfied that *A. Warhami* of Hancock is not this species, but the same as *Crassina depressa* of Brown = *A. crebricostata*, Forbes, = *A. Richardsoni*, Reeve.

*Necera subtorta*, G. O. Sars.

*Necera subtorta*, G. O. Sars, MS., Jeffr. in Ann. Nat. Hist. Dec. 1876, p. 496.

St. No. 3 (Feilden).

RECENT. Vadsö (G. O. Sars): Bergen (Koren): Hammerfest (M'Andrew): Spitzbergen (Torell): 'Lightning' Exp., 550 fms.: 'Porcupine' Exp., 1869, 62–125 fms.: 'Vöringen' Exp., 400 fms. (Friele)!

This pretty little shell differs from *N. obesa* of Lovén in being not only much smaller, but more gibbous or swollen, and in having a shorter and upturned *rostrum*, which appears twisted when viewed edgewise. *N. exigua* is more slender and delicate, besides being peculiarly sculptured. *N. pellucida* of Stimpson is distinct from any of the above.

*Saxicava rugosa*, Linné.

*Mytilus rugosus*, Linn. Syst. Nat. ed. xii. p. 1156.

St. No. 4 (Egerton); Nos. 6, 7, and 10 (Hart); No. 12 (Feilden).

RECENT. Probably in every sea throughout the world, from the upper part of the laminarian zone to the line of soundings: 'Bulldog' Exp., 1622 fms. (fragment): 'Lightning' Exp., 170–550 fms.: 'Porcupine' Exp., 1869, 90–1230 fms.; 1870, Bay of Biscay, 20–717 fms.; Mediterr., 25–92 fms.: 'Valorous' Exp., 3–60 fms.: Arctic Exp., 5½–30 fms. (Feilden).

FOSSIL. Universally distributed in the fossiliferous "Drifts" and "glacial" beds of Europe (including Sicily) and N. Asia and America; also Coralline and Red Crag. Heights 0-1360 ft., the last being at Moel Tryfaen.

*Mya truncata*, Linné.

*Mya truncata*, L. S. N. p. 1112, ed. xii.

St. No. 4 (Egerton); Nos. 5, 6, and 10 (Hart); No. 12 (Feilden).

RECENT. Seas of Northern Europe, Asia, and America, l. w.-100 fms.: 'Valorous' Exp., 3-80 fms.; fragments, 175 fms.: Arctic Exp.,  $5\frac{1}{2}$ -30 fms. (Feilden). The most southern localities recorded are the Bay of Biscay on the authority of Beltrémieux and others, and the Adriatic on that of G. v. Martens and of Danieli and Sandri. The variety *Uddevalensis* or *abbreviata* is more especially arctic, although I have dredged it in Belfast Bay and on the coast of Essex.

FOSSIL. Every raised beach and sea-bed in Europe, Iceland, and N. America, from 2 to 1360 ft.: Crimea, subfossil (Siemascho): Port Kennedy, 100-500 ft. (Walker): 'Porcupine' Exp., 65 fms.=390 ft.: Norwich, Red, Coralline, and Antwerp Crag. The usual fossil form is the variety *Uddevalensis*.

#### GASTROPODA.

*Trochus umbilicalis*, Broderip and Sowerby.

*Margarita umbilicalis*, Brod. & Sow. in Zool. Journ. vol. iv. p. 371 (1829).

St. No. 1 (Moss); No. 3 (Feilden).

RECENT. Arctic Seas (Parry and others): 'Valorous' Exp. 20 fms.: Arctic Exp.,  $5\frac{1}{2}$ -15 fms. (Feilden). See also Ann. Nat. Hist. for March 1877, p. 237.

*Trichotropis borealis*, Broderip and Sowerby.

*Trichotropis borealis*, Brod. & Sow. in Zool. Journ. vol. iv. p. 395.

St. No. 3 (Feilden).

RECENT. Arctic Seas in both hemispheres, Sitcha Isle, Iceland, Faroe I., Norway, Dogger Bank, Scotland, and Ireland, U. S. America, Canada, and Labrador, 5-150 fms.: 'Lightning' Exp., 530 fms.: 'Valorous' Exp., 57-175 fms.: Arctic Exp.,  $5\frac{1}{2}$  fms., and Dumbbell Harbour (Feilden).

FOSSIL. Bridlington, Moel Tryfaen (1330-1360 ft.), Wexford, Scotland, Norway (0-80 ft.), Sweden, Canada, and Labrador: Coralline Crag.

*Buccinum hydrophanum*, Hancock.

*Buccinum hydrophanum*, Hanc. in Ann. Nat. Hist. vol. xviii. p. 325, pl. v. f. 7 (1846).

St. No. 2 (Egerton).

RECENT. Davis Strait (Warham and Harrison, *vide* Hancock): Wellington Channel (Belcher): ? White Sea and coasts of Russian Lapland (Baer, Middendorff as *Tritonium Grœnlandicum*, var. *hydrophana*): Arctic Exp., Franklin-Pierce Bay (Feilden and Hart); Dobbin Bay, 30 fms. (Hart).

*Trophon clathratus*, Linné.

*Murex clathratus*, L. S. N. ed. xii. p. 1223.

St. No. 12 (Feilden).

For the range of this common Northern species and its variety *truncata*, as well recent as fossil, see the 'Annals of Natural History' for April 1877, p. 325. I may add that the typical form in a fossil state occurs at Macclesfield and Moel Tryfaen (500–1360 ft.), and that *Fusus costatus* of Hisinger and *F. imbricatus* of James Smith are among the synonyms. In co. Antrim the variety lives between tide-marks.

*Pleurotoma tenuicostata*, M. Sars.

*Pleurotoma tenuicostata*, Sars in Vid. Selsk. Forh. p. 259 (1868).

St. No. 1 (Moss); fragment only.

RECENT. See Ann. Nat. Hist., April 1877, pp. 329, 330. And add 'Bulldog' Exp., 1622 fms.

*Pleurotoma exarata*, Möller.

*Defrancia exarata*, Möll. Ind. Moll. Grœnl. p. 12.

St. No. 1 (Moss); fragment.

RECENT and FOSSIL. See Ann. Nat. Hist., April 1877, p. 332. And add "East-Anglian Middle Glacial deposits" (Wood and Harmer).

*Pleurotoma Trevelyana*, Turton.

*Pleurotoma Trevellianum*, Turt. in Mag. Nat. vol. viii. p. 351 (1834).

St. No. 3 (Feilden).

RECENT and FOSSIL. For the geographical and geological distribution of this species see Ann. Nat. Hist., April 1877, p. 332. Sars dredged it at the depth of 400 fms., and has recorded it as fossil at heights of 50–240 ft. It occurs in the Red and Iceland Crags.



*Cylichna alba*, Brown.

*Volværia alba*, Brown, Ill. Conch. G. B. & I. pl. xxviii. f. 43, 44 (1827).

St. No. 3 (Feilden).

RECENT and FOSSIL. See Ann. Nat. Hist., April 1877, p. 333. In the 'Porcupine' Expedition of 1869 it was dredged between the Hebrides and Faroes in 114 fms.; and in the expedition of 1870 a closely allied species, if more than a variety, came from depths of 227 and 539 fms. in the Bay of Biscay. Arctic Exp., 5½ fms. (Feilden).

CŒLEENTERATA.

ACTINOZOA.

I am informed by Dr. Moss that Capt. Feilden found in the mud-bank at Blackcliff Bay several specimens of the *corallum* or axis of a species of *Pennatula*, about six inches in length.

PROTOZOA.

FORAMINIFERA.

*Cornuspira foliacea*, Philippi.

*Orbis foliaceus*, Phil. Faun. Moll. Sic. vol. ii. p. 147, t. xxiv. f. 25.

St. No. 3 (Feilden).

RECENT. Catania (Philippi): N. Atlantic (J. G. J.).

FOSSIL. Palermo (Philippi): Lincolnshire and Cambridge-shire Fen-clays (Parker and Jones).

CRYPTOGAMIA.

MARINE ALGÆ.

*Melobesia polymorpha*, Linné.

*Millepora polymorpha*, L. S. N. ed. xii. p. 1285.

St. No. 12 (Feilden).

RECENT. All the coasts of the N. Atlantic (including Greenland), and probably a much more extensive area of the ocean.

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In connexion with the present communication I would take the opportunity of making a few remarks on Mr. Edgar Smith's list of the recent Mollusca procured by the Naturalists of the Arctic Expedition.

These remarks, although critical, chiefly relate to the selection or adoption of specific names, and do not affect the value of his excellent paper. Such difference of opinion among zoologists as to the limits as well as names of species is not only notorious, but useful. We are all actuated by the same motive, viz. the honest and careful investigation of those branches of natural history to which we devote our attention; and I can truly give Mr. Smith the fullest credit for the ability and zeal which characterize his work. .

*Modiolaria discors*, Linné; var. *levigata*.

*Modiola levigata*, Gray in Suppl. to App. of Parry's Voyage, p. ccliv (1824).

At least half a dozen species might be made out of the varieties of *M. discors*, if we regard size, shape, and the comparative number or absence of radiating striæ as specific characters. I have examined many hundred specimens from different places, and can scarcely find two precisely alike.

*Leda arctica*, Gray.

*Nucula arctica*, Gray, l. c. p. ccli.

Mr. Smith has followed Broderip and Sowerby in referring this to the species known as *N. limatula* of Say (1831), which is probably *N. lanceolata* of J. Sowerby (1817). But I must adhere to my former opinion that Gray's species is the same as the *N. truncata* of Brown (1827). Gray gives the "length (from front to back) half an inch; depth (from umbones to the opposite edge) a quarter;" he describes his shell as "very slightly concentrically wrinkled" and "obliquely truncated behind," all of which characters suit Brown's species. *Leda limatula* is three times as long and deep, according to Gray's mode of admeasurement; it is not "concentrically wrinkled," nor "truncated behind." As to Gray's shell being placed in his division "behind slightly produced, gaping," his *N. rosstrata* (*L. pernula*) is placed in another division, "behind much produced, gaping." All these three species of *Leda* "gape" more or less at the hinder extremity. Torell, in his admirable treatise on the Mollusca of Spitzbergen, has fully demonstrated that Gray's *N. arctica* is identical with Brown's *N. truncata*. Each of the above specific names has several aliases.

*Saxicava rugosa*, Linné.

I prefer retaining this specific name for the following reasons. We find, in the 12th edition of the 'Systema

Naturæ' three names given for the same species, viz. *Mya arctica*, *Solen minutus*, and *Mytilus rugosus*. None of them appeared in any of the prior editions. The only reference made to other works is in the case of *Mytilus rugosus*, where Lister's 'Animalia Angliæ' is quoted; and there can be no doubt that the quotation is correct. Hanley regarded *Mytilus rugosus* and *Mya arctica* as distinct species; and in his 'Ipsa Linnæi Conchylia' he says, as to *Mytilus rugosus*, that the only shells in the Linnean collection "contained in the box thus marked in the cabinet are worn full-aged specimens of *Saxicava arctica* or *Hiatella oblonga* of Turton." This species has no end of other synonyms.

*Trichotropis tenuis*, Smith.

In *Littorina litorea* and *Fusus antiquus* the same kind of distortion is observable. The mouth of the shell becomes more rounded or circular, and the base is more or less umbilicated. The earlier growth of the shell is quite regular in distorted specimens of the common periwinkle and almondwelk; and usually the last whorl only in such specimens is abnormal, probably in consequence of the mantle being then injured. I must venture to regard the present so-called species as a monstrosity of *T. bicarinata*.

*Buccinum sericatum*, Hancock.

Mr. Smith's description and figure of the radula do not quite agree with the description given by Mr. Jabez Hogg in my preliminary report of the 'Valorous' cruise (Proc. Roy. Soc. no. 173, p. 201), nor with his drawing, which were taken from a full-grown specimen of what I consider the same variety of *B. Grænlanticum*. The only difference consists in one of the lateral plates shown in Mr. Smith's figure having two fangs instead of three; and it may be accounted for by Mr. Smith's specimen being young. I suspect that the figures in Troschel's 'Gebiss der Schnecken,' Bd. ii. L. ii. T. vi. f. 12 and 13, have been accidentally reversed, and that f. 12 belongs to *B. glaciale* and 13 to *B. Grænlanticum*. As to the epidermis, I concur with Dr. Mörch in the remarks which he published in the last number of the 'Journal de Conchyliologie,' p. 267, viz. :—'L'épiderme des Buccins et des Fuseaux est extrêmement variable et n'offre qu'à peine des caractères spécifiques constants. Ainsi, le Buccin ondé possède, tantôt un épiderme lisse et mince, tantôt un épiderme cilié et épais. La première forme se trouve chez les individus qui vivent sur un fond rocailleux; la der-

nière sur ceux qui habitent un fond vaseux. Il me semble hors de doute que ces deux formes constituent une seule et même espèce." See also my remarks on the epidermis of *Fusus Sabini* in the 'Annals of Natural History' for April 1877, p. 327. It is impossible to form a satisfactory opinion as to the discrimination of species and varieties without having had an opportunity of examining and comparing a great number of specimens from many localities. That opportunity has fallen to my lot with respect to *B. Grænlædicum* and its varieties.

*Fusus Sabini*, Gray.

*Buccinum Sabini*, Gray in Suppl. App. Parry's Voyage, p. ccxl, = *Fusus Sabini*, Gray, Zool. Beechey's Voyage (1839).

Our arctic species agrees with Gray's description in every particular except size, which he gives as "axis three-fourths of an inch, diameter three-eighths;" and it must be borne in mind that he says, "the specimen brought home appears to be young." My largest specimen is double the above size, being an inch and a half long and three fourths broad.

I will complete Mr. Smith's list by giving a few more stations from the Arctic Expedition, as well as by adding another species.

1. *Leda minuta*, Müller.

Franklin-Pierce Bay, 15 fms. (Feilden).

2. *Trochus helycinus*, Fabricius.

Franklin-Pierce Bay (Feilden).

3. *Trochus umbilicalis*, Broderip and Sowerby.

Discovery Bay, 5½ fms. (Feilden).

4. *Trochus olivaceus*, Brown (1827).

*Trochus argentatus*, Gould (1841).

*Margarita glauca*, Möller (1842).

*Margarita Harrisoni*, Hancock (1846).

And apparently *M. albula*, Gould (1862).

These specimens were deposited in the Museum of Economic Geology.

Mr. Smith says that the arctic collection of shells leads to the conclusion that the Mollusca of West Greenland are American rather than European, because "of the 34 species obtained, at least 16 are found off the Atlantic coast of the United States, whilst only 4 or 5 have been recorded from

European Seas, and the remainder, as far as our present knowledge extends, are exclusively Greenlandic." Now I find, by analyzing his list, that out of the 34 species no less than 28 have been recorded as European and American, 2 as European and not American, 1 as American and not European, and 3 as exclusively Greenlandic.

The Crustacea collected in the Arctic Expedition have been most carefully worked out by Mr. Miers, of the British Museum, and published in the 'Annals and Magazine of Natural History' for July and August 1877. The result shows that out of 30 species of Crustacea brought home, 28 are European (Iceland, Spitzbergen, Scandinavia, Britain), and 16 only are American; 12 species are Greenlandic and European, but not American; and 2 only are Greenlandic and American (one of the latter doubtful), but not European.

There can be no question that marine animals, especially those of the Invertebrate kind, abound in the Polar Ocean as far north as it has been explored. All writers on the natural history of the arctic seas agree in this; and I can personally testify to the fact, with respect to Davis Strait, in comparison with other parts of the North Atlantic. In the late Arctic or Polar Expedition Capt Markham and Commander Parr found several specimens of a shrimp-like crustacean (*Anonyx nugax* of Phipps) and Foraminifera at the depth of 72 fathoms in  $83^{\circ} 19'$  N. lat. The expedition did not get further than  $83^{\circ} 20' 26''$ , being about a mile and half beyond the place where those marine animals were found. Professor Torell, in his essay on the Mollusca of Spitzbergen (which lies between  $76^{\circ} 30'$  and  $81^{\circ} 7'$  N. lat.), says that the seas there teem with life, and that phosphorescent animals on the surface are so numerous that, while sailing during the night, one could clearly distinguish a ray of light in the dark wake of the ship. Scoresby had given a similar account of the luminosity of the arctic seas in equally high latitudes. Sir George Nares, in his official Report of the Arctic Expedition, did not allude to the subject—although he mentioned that early in June, 1876, ducks and geese passed in small flocks of about a dozen, flying towards the N.W. from the winter quarters of the 'Alert,' in  $82^{\circ} 24'$  N. lat.; and it must be recollected that these ducks and geese subsist entirely on marine animals. I am therefore at a loss to know upon what grounds Sir Rutherford Alcock, the President of the Royal Geographical Society, stated, in his Address on the 28th of last May, as a "fact that animal marine life almost ceases to exist in the ice-covered Polar sea," and that "the Palæocrystic sea is a



sea of solitude." Possibly his statement is capable of explanation. He did not notice the 'Valorous' Expedition, which yielded no inconsiderable results by way of addition to the marine fauna of the arctic seas, and to which the President of the Royal Society had done justice in his annual address eighteen months previously.

### XXXII.—Description of a new Species of Helix.

By EDGAR A. SMITH, Zoological Department, British Museum.

#### *Helix (Merope?) Barnaclei.*

Testa imperforata, conoideo-globosa, levis, tenuiuscula, nitidissima, fulva, nigro-fusco bifasciata; spira conoidea, vix convexa, apice obtusiusculo; anfractus  $4\frac{1}{2}$ , convexiusculi, sutura distincta alba sejuncti, lineis incrementi arcuatis sculpti, ultimus subventricosus ad aperturam breviter deflexus, ad peripheriam albus obsolete carinatus, infra in medio impressus; apertura obliqua, irregulariter lunato-triangularis; peristoma leviter incrassatum, reflexum, albidum, extus castaneo marginatum, margine columellari recto, calloso albo.

Diam. max. 24 millim., min. 21; alt. 15.

Testa junior ad peripheriam anfr. ultimi acute carinata et fascia lata alba, nigro marginata, cincta, anguste perforata.

Shell imperforate in the adult state (narrowly umbilicated when immature and acutely angled at the periphery), conoidally globose, with a very shining surface, of a rich fulvous or deep fawn-colour; the upper whorls become gradually paler than the last, and towards the apex are semitransparent horn-colour and encircled by a single narrow dark brown line just above the suture, which is white; this line becomes much broader upon the body-whorl, which has a second similar band beneath the more or less white periphery; this is obsoletely keeled or angulated near the upper end of the lip, the keel vanishing altogether on the last half of the whorl; whorls  $4\frac{1}{2}$ , a little convex, having no other sculpture than the arcuate lines of growth (except in young shells, where they are obsoletely spirally striated), the last somewhat ventricose, very shortly deflexed at the aperture; beneath paler or horn-colour and a little concave in the middle or umbilical region; the aperture is very oblique, very irregularly triangular-lunate, white within, banded with black and brown (the latter not visible exteriorly); lip not much thickened on the outer and